

The Effects of Vocabulary Knowledge and Dictionary Use on EFL Reading Performance

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Abstract

The present study mainly investigated the effects of vocabulary knowledge and dictionary use on EFL reading performance. The results show that scores on vocabulary size, specific vocabulary knowledge, and reading comprehension are highly and positively correlated. Scores on specific vocabulary knowledge are more closely correlated with reading comprehension than scores on vocabulary size. Scores on specific vocabulary knowledge adds a noticeable prediction in reading comprehension over and above the prediction already afforded by scores on vocabulary size. The additional prediction can be explained by the ability to infer from the context, activating content schemata and the knowledge of polysemy of the words. It is also found that learners often overestimate their understanding of words. The results also show that the access to a bilingual electronic dictionary has a significant effect on the reading scores for both high proficiency group and low proficiency group. It is due to quick access to electronic dictionaries and relatively limited control of vocabulary in English.

Keywords: vocabulary size, specific vocabulary knowledge, dictionary use, reading performance

1. Introduction

Researchers of ESL/EFL reading have been showing great interest in the relation between reading comprehension and vocabulary knowledge. They have noted that vocabulary can be an important predictor of overall language ability. In fact, second/foreign language readers believe one of the obstacles to text comprehension is lack of adequate vocabulary.

Researchers has found that vocabulary size and reading comprehension is highly and positively correlated (Qian, 1999, 2002). Vocabulary knowledge in the line is the learner's general vocabulary knowledge. Laufer (1992) claims that second language readers of English need to have a vocabulary of at least 3000 word families in order to have some knowledge of 95 percent of the running words in a text. Following the terminology of Read (2000), the vocabulary size test is a discrete, selective and context-independent test. A context-independent test means that it is a measure in which the test-taker can produce the expected response without referring to any context. However, reading comprehension involves a task where the learner must show whether he or she understands a word given in a context.

Another aspect of the important role of vocabulary in reading comprehension is that the vocabulary load is the most important predictor of reading difficulty. Vocabulary knowledge in this line is the learner's specific vocabulary knowledge in a given text. For readers who are not familiar with difficult vocabulary in a passage, extracting meaning from the reading selection will not be easy because, as Marks, Doctorow, and Wittrock (1974) point out that unfamiliarity with low frequency words, perhaps with only one such word in a sentence, may render meaningless an entire sentence, which may, in turn, inhibit comprehension of the meaning of subsequent sentence in the same passage. In Sternberg and Powell's (1983) terms, the density of unknown words is typically higher for a second language reader than for a native speaker. When learners come across unknown vocabulary, they are encouraged to guess the meaning of unknown words based on the contextual information or context clues already contained in the reading section.

As Chapella (1994: 165) points out if we follow the logic of a communicative approach to vocabulary ability, we should not just seek to measure vocabulary size in an absolute sense, but rather in relation to particular contexts of use. Therefore, specific vocabulary knowledge contains the knowledge of some words that the learner guesses

correctly from the context in the given passage. It really reflects what happens in reading in the real life. Moreover, the specific vocabulary knowledge includes the learner's knowledge of the second, third or even fourth meaning of words in the dictionary as well as some idiomatical expressions while the vocabulary size tests deal with the primary (first) meaning of words in the dictionary.

In the research of L2 reading, a relatively modest number of studies focus on dictionary use. Most of the studies focus on the dictionary as a learning tool. Even fewer studies have specifically addressed dictionary use in EFL testing situation. Since vocabulary knowledge plays an important role in reading performance, the use of a dictionary to facilitate reading comprehension seems to have its ration. In Chinese EFL setting, we often take it for granted because the dictionary use is forbidden in achievement tests and proficiency tests. However, the past research has provided different answers to the issue of the effect of dictionary use on reading.

Bensoussan, Sim, and Weiss (1984) and Nesi and Meara (1991) investigated the effect of dictionary usage on EFL reading performance and concluded that the use of dictionary had no effect on students' test scores in reading comprehension as measured by multiple choice questions, regardless of whether the dictionary was bilingual or monolingual (although students showed a clear preference for using bilingual dictionaries).

But other researchers came to different conclusions. Luppescu and Day (1993) concluded that the dictionary users scored statistically higher than the non-dictionary users in a multiple-choice reading test. But they found that some items were harder for the group that used dictionaries. A possible explanation for this tendency was that students who were unable to locate the appropriate gloss in the dictionaries were misled as to the meaning of the word. Knight, S. (1994) found no significant difference was found for the high verbal ability groups in the dictionary and the no-dictionary condition. However, for the low verbal ability group whose dictionary/no-dictionary scores were significantly different.

With the growing popularity of electronic dictionaries, Most EFL learners in Chinese universities use the electronic dictionary rather than the print dictionary as a learning tool in class and after class. One big advantage is the dictionary's speed. Its quick speed not only facilitates use, but also encourages the user to read more in the foreign language. The issue of electronic dictionaries has not yet been widely addressed in the literature. Motivated by the contradictory findings in the past research and attracted by the widespread use of electronic dictionaries, the dictionary use during reading is also investigated in the present study.

2. Methodology

2.1 Research Questions

This paper reports on an empirical investigation to assess the relationships among vocabulary size, specific vocabulary knowledge and reading comprehension and to assess the effect of dictionary use during reading in Chinese EFL setting.

Specifically, it is designed to answer the following questions:

1. How do scores on vocabulary size, specific vocabulary knowledge in the given text, and reading comprehension correlate with one another?
2. To what extent do scores on vocabulary size contribute to predicting the reading performance? To what extent do scores on specific vocabulary knowledge contribute to predicting the reading performance?
3. To what extent does the use of a bilingual electronic dictionary during reading test affect the test scores?

2.2 Participants

Participants recruited in the present study were 110 second-year non-English majors from three intact classes in Zhejiang Gongshang University who were from three different academic disciplines-sociology, statistics and engineering management. Of the 110 participants, 14 were excluded from further data analysis when some of their scores were absent or incomplete. Of the 96 remaining participants, 52 were female, 44 were male.

2.3 Instruments

2.3.1 Vocabulary Size Test

The vocabulary size test was used to make inferences about the test taker's vocabulary size in general by measuring single meaning of content words at different levels. The test is a new version (Version 2) of the Vocabulary Levels Test which was revised and validated by Schmitt, Schmitt and Clapham (2001). The test is in five parts, representing five levels of word frequency in English: the first 2000 words, 3000 words, 5000 words, Academic Word List and 10,000 words. The new versions extend original 6 clusters to 10. That is to say, instead of 18 correct choices, there are 30 for each level. Here is an example.

- (1) birth
- (2) dust
- (3) operation (5) game
- (4) row (6) winning
- (5) sport (1) being born
- (6) victory

For more valid interpretation, the 10,000 level section was not included for the following reasons: 1) According to the higher requirements of the College English Curriculum Requirements, students should acquire a total of 6,500 words before graduation, but the participants in the study are sophomores. 2) The vocabulary in the CET-4 syllabus is around 4500. CET-4 is corresponding to the level of sophomores in English proficiency in China. In scoring, the answers were scored as correct or incorrect. Each correct answer was given one point. Therefore the maximum score for the test was 120 (30 per frequency level x 4 levels).

2.3.2 Reading Comprehension Test

The test contained four passages of written texts with multiple-choice questions for measuring reading ability. The passages were chosen from CET-4 Test based on the following criteria: the topics are familiar to the participants but not biased toward any academic discipline. The passages are similar in length and difficulty and appropriate for the academic level of the participants. As for the validity of the reading test, since the original version of the test was taken from CET 4 test, the validity was taken for granted. In scoring, each correct answer to a reading question was given one point. The maximum score was 20.

2.3.3 Translation Test

The translation test attached to the reading comprehension was intended to test the specific vocabulary knowledge in a given text. The words for the translation test were chosen from the passages. Two categories of words were selected from the passages: 1) words the meaning of which participants can guess from the context; 2) words participants have to look up in the dictionary in order to be able to comprehend the text. The words were discussed and decided upon by two experienced teachers. In order not to give any hint to the participants in the dictionary use experiment, some difficult words that were not needed for the comprehension in the passage were also included in the test. But in scoring they were excluded. Here “comprehending the text” means “being relevant to answering the questions”. All the participants were informed that the words in the translation test might or might not lead to the information required for the question.

Two judges rated whether the words were correctly translated relative to the context by using the following criteria: When a blank was left next to the word, or when the word was mistranslated, it received 0 point. When the translation was correct, it received 1 point. When it was approximate, i.e. contained some of the semantic features, but not all, it received 0.5 point. The inter-rater reliability is 0.95.

2.4 Procedures

The study was conducted in two weeks before they took the final examination. All the three instruments were administered to participants as part of their normal class work. In the first week, the reading comprehension test and translation test were conducted. In the second week, two vocabulary size tests were conducted.

The reading and translation study was carried out in three stages. In stage one, the participants were asked to read the passages and do multiple-choice questions and underline the unknown words in the passage. Upon completion, the answer sheets were collected. In stage two, immediately after the collection of the reading sheets, they were given the translation test. They were asked to translate the words which the two experienced teachers think the participants need to know or guess for the comprehension of the text, and put a tick before the words they guessed from the passage. The translation of words that the participants guessed from the context was scored separately. The scores mean the ability to infer from the context. In stage three, immediately after the collection of the translation sheets they were asked to look up the unknown words in the passage in the dictionary (a bilingual electronic dictionary) and do the multiple-choice questions again. The text sheets remained with the participants during the study. Participants were allowed to take as much time as they wanted.

2.5 Data Collection and Data Analysis

During the data collection, for each student, we obtained five data sheets. Two of these contained reading comprehension sheets before and after dictionary use. One is measuring reading ability. The other is assessing dictionary use effect. The Vocabulary Levels Test is measuring vocabulary size while the translation test is

assessing specific vocabulary knowledge and the ability to guess from the context.

Since all the data were of the interval type, two-tailed Pearson product-moment correlations, T-test analysis and multiple regression were chosen as the dominant techniques for the statistical analyses.

3. Results

Table 1 reports the descriptive statistics generated from the data analysis. As seen from the table, there is a reasonable spread of the obtained score ranges and standard deviations.

Table 1. Descriptive Statistics for the RC(I), RC(II), VS, SVK and WG

	N	Range	Minimum	Maximum	Mean (%)	MPS	Std. Deviation
RC(I)	96	13	5	18	12.66(63.3%)	20	2.835
RC(II)	96	8	10	18	14.66(73.3%)	20	1.776
VS	96	70	30	100	62.72(52.3%)	120	16.544
SVK	96	42	18	60	41.61(61.2%)	68	10.298
WG	96	10	3	13	7.74	/	2.617

Notes:

RC (I) = scores on the reading comprehension before the dictionary use

RC (II) = scores on the reading comprehension after the dictionary use

SVK = scores on the specific vocabulary knowledge in the passages

VS = scores on the vocabulary levels test

WG = scores on the words guessed from the context

MPS = maximum possible scores

Research Question 1: How do scores on vocabulary size, specific vocabulary knowledge in a text, and reading comprehension correlate with one another?

Table 2. Correlations among SVK, VS and RC (1) (n=96)

	RC(I)	SVK	VS
RC(I)	1	.719(**)	.665(**)
SVK		1	.785(**)
VS			1

** Correlation is significant at the 0.01 level (2-tailed).

Table 2 shows the Pearson Correlation coefficients obtained for the variable pairs of RC, SVK and VS are all higher than 0.60 ($p < 0.01$). In other words, high and positive intercorrelations exist among the scores on the three tests. The high correlation between SVK and VS scores may be due to the partial construct overlap of the two measures. SVK measures learner's specific vocabulary knowledge in a given text. VS measures learner's general vocabulary knowledge or vocabulary size.

Research Question 2: To what extent do scores on vocabulary size contribute to predicting the reading performance? To what extent do scores on specific vocabulary knowledge contribute to predicting the reading performance?

Table 3. R Square of the Correlation Coefficient Between Each Predictor Variable and the Criterion Variable(n=96)

	R	R Square	Sig.
VS	.665	.443	.000
SVK	.719	.517	.000

Criterion Variable: RC

Table 3 presents values of R^2 of the correlation coefficients that were put to the significance testing. As it shows, VS alone explains about 44.3% of the variance in the criterion variable in RC. SVK alone explains about 51.7% of the variance in the criterion variable in RC. It indicates vocabulary plays a very important role in reading performance no matter whether it is general vocabulary knowledge or specific vocabulary knowledge. The predictive values of SVK, VS in explaining the variance in RC were investigated further in a series of multiple-regression analysis, as follows. The focus of the analyses was on examining the magnitude of R^2 changes. These procedures and R^2 changes are summarized in Table 4 and in the text below.

1. Using the forced entry procedure, VS was entered into the equation at the first step. At this point, the R^2 was 0.443 ($p < 0.01$).
2. The entry of SVK at the second step changed the size of the R^2 to 0.578, showing an increase of 0.145, or 14.5% of the explained variance in RC ($p < 0.01$).

Table 4. Regression results with the SVK and VS as the independent variables ($n = 96$)

Model	R	R Square	Adjusted R Square	Change Statistics		
				R Square Change	F Change	Sig. F Change
1	.665(a)	.443	.437	.443	34.649	.000
2	.760(b)	.578	.573	.145	22.347	.000

a Predictors: (Constant), VS

b Predictors: (Constant), VS, SVK

Of the two predictor variables, SVK added a unique portion (14.5%) of explained variance in RC on top of the 44.3% variance accounted for by VS. This unique portion can be explained. SVK scores more accurately than VS because SVK is a context-dependent test while VS is a context-independent test. SVK includes some words that can not be known in the context-independent test. That is, the learner can infer the meaning of some unknown words from the context.

Research Question 3: To what extent does the use of a bilingual electronic dictionary during reading test affect the test scores?

The present test design was slightly different from previous studies in which half of the participants were tested in the dictionary situation and the other half were tested in the non-dictionary situation. In the study all the participants are tested in both the dictionary situation and non-dictionary situation with the same passages. Time is not a factor in the reading test in the present study, so it can address the research question.

As is shown in Table 5, the participants in non-dictionary condition have an overall mean of 12.66 in reading comprehension, while the participants in dictionary condition attain an overall mean of 14.66. The Paired-Samples T Test indicates a significant difference between the two means ($p < 0.01$) (see Table 6). That is, the access to a bilingual electronic dictionary has a significant effect on the reading comprehension. In order to obtain detailed information about dictionary use effect and make a comparison with the findings of the previous research, the subjects are divided into high verbal ability and low verbal ability according to their scores in final examination. From Table 5, it can be seen that the group of low verbal ability raise their scores by 3.05 (29.0%) with the access to the dictionary while the group of high verbal ability raise their scores by 1.08 (7.4%). It indicates the dictionary use effect varies with proficiency level though significant difference is found for the group of high verbal ability in the dictionary and the non-dictionary condition. This is also true for the group of low verbal ability whose dictionary/non-dictionary scores are significantly different (see Table 6). The results confirm part of the findings of Knight (1994). Detailed explanation will be found in the discussion section with the Table 7 and Table 8.

Table 5. Means and Standard Deviations of Reading Scores by Proficiency level, and Dictionary Condition

Level		RC(I)	RC(II)
high	Mean	14.55	15.63
N=51	Std. Deviation	1.689	1.216
low	Mean	10.51	13.56
N=45	Std. Deviation	2.292	1.673
Total	Mean	12.66	14.66
N=96	Std. Deviation	2.835	1.776

Table 6. Paired-Samples T Test

RC(II)-RC(I)	Paired Differences			Sig. (2-tailed)		
	Mean	Std. Deviation	Std. Error	T	df	Sig. (2-tailed)
Pair 1 high - high	1.078	.771	.108	9.995	50	.000
Pair 2 low - low	3.044	1.364	.203	14.968	44	.000
Pair 3 total - total	2.000	1.465	.150	13.372	95	.000

Table 7. VS scores by Proficiency Level

level	Mean	(%)	Std. Deviation	N
high	70.69	(58.9%)	14.545	51
low	53.68	(44.7%)	13.717	45
Total	62.72	(52.3%)	16.544	96

Table 8. Correlation between Gains and Proficiency (n=96)

		gains	Proficiency
gains	Pearson Correlation	1	-.736(**)
	Sig. (2-tailed)		.000
Proficiency	Pearson Correlation		1
	Sig. (2-tailed)		

** Correlation is significant at the 0.01 level (2-tailed).

4. Discussion

4.1 Vocabulary Knowledge and Reading Comprehension

The correlations among SVK, VS, and RC indicate that the vocabulary knowledge is highly, positively correlated with the learners' general academic reading comprehension levels. In the present study the correlation between vocabulary size based on Vocabulary Levels Test and reading comprehension is moderate ($r=0.665$ $P<0.01$), which confirmed most of the findings of the previous research. It indicates the most effective way to improve reading comprehension is to increase the learner's vocabulary size, although we acknowledge the importance of other reader variables, such as motivation, metacognitive strategies.

In the multiple regression analysis, the results show SVK adds a noticeable 14.5 % of explained variance in RC over and above the prediction already afforded by VS. In other words, unknown vocabulary in a text is most important predictor of reading difficulty for the learners. This additional predication can be explained in the following. First, SVK directly influences the comprehension of the given passages. Second, this vocabulary test is a context-dependent test. It may not simply be measures of lexical knowledge, or even of subject matter knowledge. One of the hypotheses on the reading and vocabulary connection is knowledge hypothesis provided by Anderson and Freebody (1981). The hypothesis states performance on vocabulary tests is seen as an indicator of good world knowledge. The person who scores high has deeper and broader knowledge of the culture. This position emphasizes two essential points: first, knowing a word well indicates that one knows many words and concepts related to it. Second, this larger chunk of knowledge is crucial for understanding a given text. Rather than being directly important, possessing certain word knowledge such as meaning is a sign that the individual may possess the knowledge needed to understand a text. The more specific vocabulary knowledge the learner has, the greater the probability of activating the learner's content schemata is, which will improve reading comprehension. Third, the specific vocabulary knowledge includes the knowledge of some idiomatical expressions (such as *pass off*, *on the edge of* and etc. in the translation test) as well as the second, third or even fourth meaning of words in the dictionary. Take one word for example, the different meanings of words are ordered according to the *Oxford Advanced Learner's English-Chinese Dictionaries* (6th edition).

Distress

1. a feeling of great worry or happiness; great suffering.
2. suffering and problems caused by not having enough money, food, etc.

In the translation test, the second meaning of “distress” are tested rather than the first meaning. Besides, there are other words in the test, such as “pursue”, “approve”, “deliver”, “afford”, “appeal”, etc.

Fourth, The SVK includes the knowledge of some words that learners infer from the context, which means the ability to guess from the context.

Other statistic analyses are conducted to find out some valuable information. The correlation between the words guessed from the context and the words that learners have already known out of context is 0.69 ($P < 0.01$). It indicates that the more known words in the passage the learner has, the easier to guess correctly from the context it is. If the learner comes across many unknown words in a text, he may be unable to make use of contextual clues that are available in the text because the words which provide such clues for a particular target word are themselves unknown.

A formula is used to estimate the mismatch between the actual unknown words and the perceived unknown words. The actual unknown words are the unknown words in the translation test. The perceived unknown words are the common words that the test-takers underlined in the passages and they didn't know in the translation test. The statistic analysis indicates that the number of the actual unknown words is 49% higher than that of the perceived unknown words. The over-assessment is due to polysemy of the words and learners' unawareness of an unknown word. In the present study, the words whose meanings are inappropriate in the context are considered to be unknown words. From the translation test, the reason for the lack of awareness of an unknown word is that some words look as if they provided clues to their meaning. These words fall into two categories.

1) The words with similar forms. The examples of such confusion in the present study are “threat” with “treat”, “trail” with “trial”, “wealthy” with “healthy”, “deceive” with “receive”, “familiar” with “similar”, “sufficient” and “efficient”, “charge” and “change” and etc. Such confusion may be due to incomplete word knowledge. The learner might study the group but since the knowledge of both is insecure, he or she is not sure which word form is associated with which meaning. The meaning of the words can be corrected with the help of dictionary if the learner realizes the confusion.

2) Words with a deceptive morphological structure. For example, the structure of the word “recreation” is incorrectly analyzed as “re+creation” and interpreted as “the act of creating again”. “positive” is incorrectly analyzed as “pose+tive”. The meaning of the whole word is misinterpret from its parts: “approve” is misinterpreted as “prove”; “distress” as “stress”.

4.2 Dictionary Use While Reading

The results of the present study contradict the findings of some researchers, such as Bensoussan, Sim, and Weiss (1984), Nesi and Meara (1991), who found no significant difference in comprehension scores for those in dictionary condition and non-dictionary condition. One of the major differences between the two studies is the dictionary type. The participants in the present study use a bilingual electronic dictionary while other studies use a print dictionary. One of the advantages of the electronic dictionary is the speed. It enables quick search, which may enhance reading rather than disturb it.

However, the results confirm part of the findings of Knight (1994) that there was a significant difference in the dictionary condition and non-dictionary condition for the low proficiency group. But there are contradictory findings for the high proficiency group between the two studies. One possible explanation is the proficiency level of the subjects. As is seen in Table 7, even the high proficiency group had a mean of 70.69 (58.9%) in VS. Compared with the subjects in Knight's research who were Spanish second year students at Central Michigan University, the subjects in the present study would be considered low proficiency level. Table 8 shows Pearson correlation between the gains in reading scores by dictionary use and final examination scores was high and significant -0.736 ($p < 0.01$). The negative correlation means that the higher the proficiency level of the participants is, the fewer gains they get, the less effect the dictionary use has on reading. That means beginning learners are much more dependent on vocabulary for comprehension. Many high proficiency learners refer to the dictionary for verification. The low proficiency group can increase comprehension by looking up unknown words in the passage because the vocabulary knowledge is positively and highly correlated with the reading comprehension.

The 20 reading comprehension questions were grouped into the three categories: factual detail, main idea, and inference. Two question types -the factual detail and inference were investigated for analysis. It can be found that the scores on the factual detail questions are raised by 25% after dictionary use while scores on the inference question are raised by 9%. It indicates the factual detail questions are more dependent on learner's individual vocabulary knowledge, but the inference questions involve learner's reason and general ability, which supports

the argument that dictionary use mainly helps with the microcomprehension of the text. One feature is that the reader is more dependent on the individual words and the process is not selective. Tests which contain a large number of items where knowledge of individual words is crucial may be more affected by the availability of a dictionary than tests with few items of this type. Thus, the effect of dictionary use on reading is significant.

Although the low proficiency group has access to the electronic dictionary, the mean score is still below 14 (70%). The possible explanations are the following: 1) The dictionary can not solve all the learners' problems with vocabulary. Learners need to identify the proper meaning in the dictionary to fit the context. Sometimes learners are misled as to the meaning of the word. 2) Some words similar in forms are misinterpreted because they are unaware of or confused about these unknown words. 3) Though vocabulary plays the most important role in the reading, reading involves many text variables, such as text organization, syntax.

5. Conclusion

Vocabulary is central to language. The present study sheds light on the importance of vocabulary knowledge in EFL reading performance, to be specific, vocabulary size and specific vocabulary knowledge, and the effect of dictionary use on reading performance.

The results show that vocabulary size, specific vocabulary knowledge and reading comprehension are highly, positively correlated. The correlation between specific vocabulary knowledge and reading comprehension is higher than that of vocabulary size and reading comprehension. Specific vocabulary knowledge adds a noticeable 14.5 % of explained variance in reading comprehension over and above the prediction already afforded by vocabulary size. The additional prediction can be explained by the ability to infer from the context, activating content schemata and the knowledge of polysemy of the words. It is found that the learners often overestimate their understanding of words. The mismatch is due to polysemy of the words and learners' unawareness of an unknown word. The words with similar forms and with a deceptive morphological structure are especially difficult for the learners to learn.

The results also show that the access to a bilingual electronic dictionary has a significant effect on the reading comprehension score for both high verbal ability group and the low verbal ability group. It is due to quick access to electronic dictionaries and relatively limited control of vocabulary in English. It is also found that dictionary use largely helps with the microcomprehension of the text.

The present study has the following pedagogical implications for English language teaching at the tertiary level. First, since increasing vocabulary size can improve reading comprehension. Reading, in turn, helps vocabulary growth. The learners are encouraged to enlarge the vocabulary by intentional learning from the textbook and incidental learning from extensive reading. Some textbooks, such as New College English encourage the student to become an independent word learner because the number of words to be learned is too enormous to rely on word-by-word instruction. It is an effective way to enlarge the vocabulary. Second, the ability to infer the meaning of unknown words is encouraged and instructed in class by the teachers because they can really improve reading comprehension. Moreover, this guessing will lead to the vocabulary acquisition. But in practising guessing the meaning of words from context, teachers should warn the learners not to depend too much on word morphology, as some of them may be "pseudofamiliar". Third, in presenting a group of new words, the effective way is to introduce each one separately.

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